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Christopher M. Anderson

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SHIMOKAJI & ASSOCIATES, P.C.
8911 RESEARCH DRIVE
IRVINE, CA 92618

EXAMINER

BARTON, JEFFREY THOMAS

ART UNIT

PAPER NUMBER

1753

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/721,929

Applicant(s)

ANDERSON, CHRISTOPHER M.

Examiner

Jeffrey T. Barton

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 27-33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 8-26 is/are rejected.
- 7) ☒ Claim(s) 7 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1-26 in the reply filed on 20 July 2007 is acknowledged.

Claim Objections

2. Claim 5 is objected to because it is a substantial duplicate of claim 2. The claims have identical scope, and Applicant should amend one such that its scope is different from the other, or delete one of these claims. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 9-11 and 13-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 9, there is no positive antecedent basis for "said system controller" in line 3 of the claim. In addition, there is no positive antecedent basis for "said pH sensor" in line 4, "said water level sensor" in line 4, "said water fill valve" in line 4, said "electrolyte fill valve" in lines 4-5, and "said oxygen vent valve" in line 5. Antecedent basis for these five limitations would be provided by changing dependence to be on claim 7. In addition, there is no antecedent basis for "said hydrogen tank fill

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valve" in line 5, "said hydrogen tank output valve" in lines 5-6, and "said pressure gauge of said hydrogen tank" in line 6. Antecedent basis for these three limitations would be provided by changing dependence to be on claim 8.

Regarding claim 10, there is no positive antecedent basis for "said electrolyte" in line 2 and "said electrolysis chamber" in lines 2-3 of the claim. It appears dependence from claim 7 was intended, and the claim is treated as such herein.

Regarding claim 11, there is no positive antecedent basis for "said electrolyte" in line 2 of the claim. It appears dependence from claim 7 was intended, and the claim is treated as such herein.

Regarding claim 13, there is no positive antecedent basis for "said solar panel" at lines 14 and 17 of the claim. This would be corrected by moving the "a solar panel" limitation from lines 33-35 of the claim to a position earlier in the claim, such as starting at line 9. Also, there is no antecedent basis for "said source water tank" in line 23. Also, there is no antecedent basis for "said fuel cell" in line 48 of the claim. This would be corrected by moving the "a hydrogen-powered fuel cell" limitation from lines 51-53 of the claim to an earlier position, such as starting at line 44. Also, there is no antecedent basis for "said AC power source" in line 55 of the claim. The same grounds apply to claims 14-20.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-6 and 21-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cifaldi in view of either Moroi et al or Araoka et al.

Regarding claims 1, 5, and 21, Cifaldi discloses a system comprising a solar electrolysis power source comprising a solar panel (Figure 2, cells 46 on collector 10), an electrolysis unit (Figure 3; Column 7, lines 19-47); a hydrogen tank (Figure 3; tank 154); a hydrogen powered fuel cell (Column 7, lines 40-42); and a control unit including an inverter (Figure 2, inverter 138), a microprocessor (Figure 2; Within computer 96), and a modem (Figure 2, within computer 96; Column 6, lines 51-56); wherein said microprocessor is connected with said modem (Column 6, lines 51-56) and said inverter (Column 6, lines 46-56; Column 7, lines 52-58; Figure 2); and wherein said microprocessor controls said inverter. (Column 6, lines 46-56; Column 7, lines 52-58; Figure 2)

Regarding claims 2, 5, and 21, Cifaldi discloses the inverter being connected to a power grid (Column 7, lines 52-58; Column 2, lines 43-45), which is typically monitored and controlled by a local power utility, and wherein the inverter is connected with an individual consumer (Column 7, lines 52-58; the building's occupant(s) correspond to such a consumer), and wherein said microprocessor is linked to said local power utility through said modem. (Column 6, lines 51-56; connection via phone line provides such a link)

Regarding claims 3 and 21, Cifaldi discloses the solar electrolysis power source producing and storing hydrogen gas, and providing hydrogen gas to the fuel cell. (Column 7, lines 19-31 and 40-44)

Regarding claim 6, Cifaldi discloses the electrolysis system including a source of water (conducted via 162); wherein said electrolysis unit is connected with said source

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of water (Figure 3) and receives water from said source of water, and wherein said electrolysis unit provides the electrolysis of said water and produces hydrogen gas and oxygen gas (Column 7, lines 19-46); wherein said solar panel is connected with said electrolysis unit and wherein said solar panel receives solar rays and provides electrical energy to said electrolysis unit (Column 7, lines 19-23); and wherein said hydrogen tank is connected to and received hydrogen gas from the electrolysis unit. (Column 7, lines 28-31)

Regarding claims 22-26, no particular weight can be given to the limitations in these claims, since they are entirely directed to intended use of the system defined in claim 21. Since Cifaldi's system is controlled by a computer connected to the system via a telephone line (Column 6, lines 46-60), it is perfectly capable of receiving control signals from an electric utility or any other desired entity having access to the telephone lines. Since the system is therefore capable of carrying out the intended function, the limitations do not render the claims patentable.

Cifaldi also teaches that automatic control of system functions from a central controller that is controlled by a computer is preferred, citing the ease of modification of the schemes. (Column 6, lines 46-60)

Cifaldi does not explicitly teach a hermetically sealed compressor, nor does he explicitly teach the microprocessor being connected to or controlling the hydrogen-powered fuel cell.

Moroi et al teach a hermetically sealed compressor used in compressing oxygen and hydrogen gases produced by hydrolysis for storage and later consumption in a fuel cell. (Abstract; Background; Summary sections; Paragraph 0037)

Araoka et al teach compressors 9a and 9b, used to compress oxygen and hydrogen gases produced by hydrolysis for storage and later consumption in a fuel cell. (English Abstract)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Cifaldi by specifically connecting the computer 96 to the fuel cell disclosed as useful in the system, in order to control the fuel cell operation within the system, because Cifaldi teaches the advantage of automatic control of system components, in that modification of operation schemes is facilitated. (Column 6, lines 46-60)

It would also have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate a compressor between the hydrogen output of the electrolytic cell and the hydrogen storage tank, as taught by either Moroi et al or Araoka et al, because it would allow storage of the hydrogen gas at elevated pressures, reducing the tank size necessary for hydrogen storage. As evidenced by Muroi et al and Araoka et al, such compression means for the hydrogen produced in an electrolytic system is conventional, and the benefits of increased hydrogen storage density would have been clear to one having ordinary skill. In addition, hermetic sealing of such a compressor and any other component of a hydrogen gas processing system would

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have clearly been obvious, in order to prevent hydrogen leakage and the explosion hazard that would result.

Regarding claim 4, selection of the output voltage and frequency of the inverter would depend on the requirements of the loads to be powered. Selection of any useful frequency and voltage would have been obvious to one having ordinary skill in the art, depending on this consideration.

9. Claim 8 rejected under 35 U.S.C. 103(a) as being unpatentable over Cifaldi and either Moroi et al or Araoka et al as applied to claims 1-6 and 21-26 above, and further in view of Mérida-Donis.

Cifaldi in view of either Moroi et al or Araoka et al teaches systems as described above in addressing claims 1-6 and 21-26.

None among Cifaldi, Moroi et al, and Araoka et al explicitly teaches a hydrogen tank including a fill valve, output valve, and pressure gauge as claimed.

Mérida-Donis teaches a system for electrolytic hydrogen production and use in a fuel cell, comprising a storage means 706, which can be pressurized storage (Column 15, lines 56-58); a fill valve 820 between the hydrogen source and storage means 706; an output valve (regulator 854) located between the storage means and fuel cell 802; and a pressure gauge 818 indicating the pressure of the hydrogen gas in the storage means. (Column 15, lines 57-61)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the system of Cifaldi and either Moroi et al or

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Araoka et al by providing the hydrogen tank with inlet and outlet valves, as well as a pressure gauge, as taught by Mérida-Donis, because Mérida-Donis teach the effectiveness of such means in controlling the flow, pressure, and consumption of hydrogen gas in such electrolytic hydrogen fuel cell systems. A skilled artisan would have recognized the value of such flow and pressure control means in a hydrogen gas system, in that they provide necessary control to maintain safe pressures of hydrogen in the system.

10. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cifaldi and either Muroi et al or Araoka et al as applied to claims 1-6 and 21-26 above, and further in view of the further teachings of Araoka et al.

Cifaldi in view of either Moroi et al or Araoka et al teaches systems as described above in addressing claims 1-6 and 21-26.

Neither Cifaldi nor Moroi et al explicitly teaches a water source that is a water tank holding water.

In addition to the teachings cited above, Araoka et al teach that water is provided to an electrolytic cell for hydrogen production from a water tank 3. (English Abstract)

It would have been obvious to one having ordinary skill in the art to modify the water line 162 of Cifaldi by specifically connecting it to a water tank, as taught by Araoka et al, because a water tank is known in the art to be a convenient means for holding water to be provided to an electrolytic cell as needed, as evidenced by Araoka et al. As water is consumed in the cell, it will necessarily need to be replenished,

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particularly in embodiments where the water generated by the fuel cell is not collected and returned to the electrolytic cell. A water tank is a conventional, convenient means for doing so. The results of such a modification would have been predictable and desirable.

Allowable Subject Matter

11. Claim 7 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. Claim 13 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

13. Claims 14-20 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

14. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to teach or fairly suggest providing a fuel cell system as set forth with a pH sensor, water level sensor, or electrolyte tank as claimed.

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Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571) 272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JTB
12 September 2007



NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700